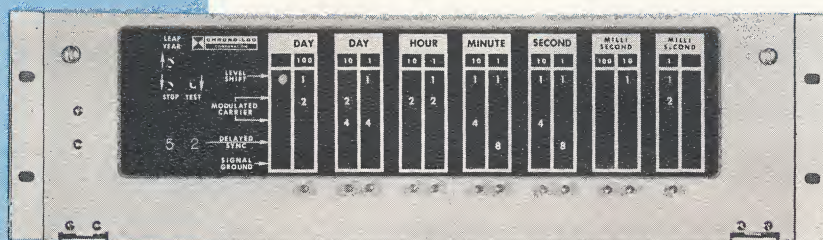


Series
20,000



TIME CODE GENERATOR

The Chrono-log Series 20,000 Time Code Generators are designed to generate time code formats for use in recording systems, telemetry systems, range-timing systems and other real-time digital systems. Among the time code formats which can be furnished are:

IRIG-A	IRIG-E
IRIG-B	NASA-36
IRIG-C	NASA-28
IRIG-D	AMR D-5

Time codes can be furnished with or without the day-of-the-year. IRIG time code formats are normally provided without the 17 bit straight binary data. Other codes are available as special options.

The Series 20,000 Time Code Generators provide various outputs, as follows:

- (1) A serial time code output, using a pulse-width and amplitude modulated carrier.
- (2) A level-shift serial output in the same format as the modulated carrier output.
- (3) A parallel output of the time, in BCD code with complement, with a resolution of 0.1 milliseconds.
- (4) Pulse rate outputs at various frequencies, for synchronizing external equipment to the Generator.

All outputs are short-circuit proof. The pulse widths and pulse rates are derived from the counters in the digital clock section of the Time Code Generator, insuring synchronism of all functions.

An internal oven-mounted crystal oscillator is used as the frequency standard. Stability of the oscillator is 1 part in 10^8 per day. If greater stability is required, the unit may be operated from a customer-furnished external frequency standard.

For BCD codes such as the IRIG codes, the visual display of time is an 8-4-2-1 BCD coded display for each digit. For binary codes such as AMR D-5, the display is in octal code. The display relates directly to the status of the counting decades and the actual format of the time code and is excellent for maintenance and checking. The display is also used for time-setting. As options, local and remote in-line decimal displays of the time can be furnished.

Front panel controls are provided to set the time, advance the time in increments as small as 0.1 milliseconds and, with a customer furnished oscilloscope, synchronize the Generator to an external standard such as WWV. A unique self-test panel provides indication of the operation and status of key circuits in the Generator. Manual controls provide for step-by-step testing of the Generator for ease of service.

The Series 20,000 Time Code Generators use solid state circuitry, with "worst-case" design and derating of all components. Etched circuit plug-in construction is used for all circuits with plug-in cards accessible from the hinged front panel. Etched circuit cards contain edge mounted indicating lamps for all flip-flops and edge mounted short-circuit proof test jacks for key parameters. The power supply regulator circuit is included among the plug-in cards. All cards can be operated on an extender, thus exposing the entire card for troubleshooting. Bulky power supply parts such as the power transformer, are mounted on the hinged rear door and are accessible for troubleshooting without removing the unit from the rack.

Standardized card designs are used to group related logical functions on a card and to reduce the number of card types in a unit to a minimum. A spare parts kit, consisting of one of each card type plus assorted power supply parts, is available.

IRIG-A

IRIG-B

IRIG-C

IRIG-D

IRIG-E

NASA-36

NASA-28

AMR D-5

GENERAL SPECIFICATIONS

TIME CODE FORMATS: Any one of the following time code formats can be furnished:

IRIG-A	IRIG-E
IRIG-B	NASA-36 bit
IRIG-C	NASA-28 bit
IRIG-D	AMR D-5

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WILD & ASSOCIATES, INC.
100 Michael Drive, Syosset, L. I., N. Y.
(Phone 516 - Walnut 1-7100)

IRIG formats are normally furnished without the 17 bit straight binary data. Formats can be furnished with or without the day-of-the-year. Other codes are available as special features.

MODULATED CARRIER SERIAL OUTPUT: The serial time code is provided as an amplitude modulated carrier of appropriate frequency. Amplitude is 10 volts peak-to-peak into a 600 ohm load. MARK amplitude is normally 3.3 times the SPACE amplitude. The MARK/SPACE ratio is adjustable from 2:1 to 5:1.

LEVEL-SHIFT SERIAL OUTPUT A D.C. level-shift output in serial form is provided. D.C. levels are 0 volts for OFF, —10 volts with source impedance of 1000 ohms for ON.

PARALLEL OUTPUT: An 8-4-2-1 BCD output of the time reading to the nearest 0.1 millisecond with the complement of each bit, is provided. Logic levels are 0 volts for a "false" and —10 volts with a source impedance of 860 ohms for a "true" output, capable of driving a 5000 ohm load to ground.

PULSE RATE OUTPUTS: The following pulse rate outputs are furnished:

1 pps.	100 pps.
10 pps.	1000 pps.

Pulse rate outputs are negative going from ground to —10 volts, capable of driving a 5000 ohm load to ground. Pulse widths are 5 to 10 microseconds with a rise time of 1 microsecond or faster.

OUTPUT PROTECTION: Output circuits will not be damaged by a direct short from output to ground.

VISUAL DISPLAY: For BCD codes, the visual display of time is an 8-4-2-1 BCD display for each digit down to 0.1 milliseconds. For binary codes, an octal display is used. The displays relate directly to the status of the counting decades and the actual format of the time codes. Local and remote in-line decimal displays of the time reading to the nearest second can be furnished as options.

INTERNAL FREQUENCY STANDARD: An internal 1 MC oven-mounted crystal oscillator is used as the frequency standard. Stability of the oscillator is 1 part in 10^8 per day. The gold plated quartz crystal is mounted in a glass envelope. Ambient temperature variations from 0°C to 55°C will shift the frequency less than 3×10^{-8} . An adjusting screw is provided on the front of the oscillator to re-adjust the oscillator frequency to compensate for frequency shift.

EXTERNAL FREQUENCY STANDARD: If even greater stability than that provided by the internal standard is required, the unit may be operated from a customer-furnished external 1 MC frequency standard.

TIME SETTING: Individual front panel pushbuttons are provided to set the time reading to the nearest 0.1 millisecond.

FRONT PANEL SELF-TEST CONTROLS and TEST JACKS:

- STOP** switch stops the Time Code Generator. No time code output is produced.
- TEST** switch stops time from accumulating but does not stop time code from being generated. The Time Code Generator repeatedly generates the same time code.
- LEAP YEAR** switch (only provided on units that generate day-of-the-year portion of code) changes maximum count of days counter from 365 to 366. Days counter resets to 001 after maximum count.
- DELAYED SYNC** thumb switches. A pair of digital thumb switches allow digital selection of any character (00 to 99) of the time code. The unit will generate a negative sync pulse 5 to 10 microseconds wide at the start of the selected character. The pulse is of —6 to —10 volts amplitude and can drive a 1000 ohm load.
- DELAYED SYNC** test jack. The delayed sync pulse appears at this jack.
- SIGNAL GROUND** test jack.
- MODULATED CARRIER** test jacks. The modulated carrier time code output appears at a pair of front panel test jacks in addition to the output connector on the rear.
- LEVEL-SHIFT** indicator light is lit when the Time Code Generator is producing marks and not lit when it produces spaces.

SYNCHRONIZATION TO WWV: If the front panel **DELAYED SYNC** thumb switches are set to 00, the delayed sync pulse will occur at the start of the frame. This pulse may be used as the sync input to an oscilloscope (customer-furnished). The WWV one-pulse-per-second "tick" from a customer furnished WWV receiver should then be fed to the vertical or Y input to the oscilloscope. Using an oscilloscope with a calibrated triggered sweep, the time difference between the Time Code Generator and WWV may be measured directly. The pushbuttons may be used to advance the Time Code Generator, in increments as fine as 0.1 millisecond, until the Generator and WWV are in agreement.

An alternate method is to advance the **DELAYED SYNC** thumb switches until the WWV tick occurs at the start of the sweep. The setting of the thumb switches will then indicate, in tens of milliseconds, the time difference between WWV and the Time Code Generator. This time difference may be eliminated by advancing the Time Code Generator by means of the setting pushbuttons.

SYNCHRONIZATION TO SYSTEM TIME: **RESET** and **HOLD** circuits in the Generator allow an external system to start the Generator within 0.1 millisecond of a reference signal in the external system. These features also allow use of the Generator as an elapsed time unit.

REAR PANEL CONTROLS AND CONNECTORS:

- Power on/off switch.
- Fuse, 1A, 250 V, SLOW-BLOW (MDL-I)
- Output connectors

INPUT POWER: 115 volts plus or minus 10 volts, 50 to 75 cps.

OPERATING ENVIRONMENT: The equipment will operate over a temperature range of —30°C to +55°C. This is the ambient temperature in the immediate vicinity of the Chrono-log equipment and assumes that no hotter elements are radiating heat to the Chrono-log equipment. The top and bottom of the units must be kept clear to allow for normal airflow. Relative humidity may range from 0 to 95%.

SIZE (Without Optional Features):

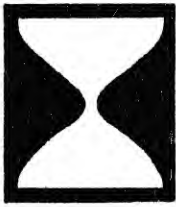
Standard relay rack mounting, 19" wide, 5 1/4" high and 17" depth behind panel.

OPTIONAL FEATURES: Due to their modular design, the Chrono-log Time Code Generators can be furnished with many optional features including:

- Slow code level-shift outputs for recording on oscillographs.
- Multiple code outputs in a single Generator.
- Local and remote in-line decimal displays of the time reading to the nearest second.
- Buffer amplifiers for BCD parallel output.
- Battery operation, either as the main power source or as standby power.

CHRONO-LOG CORP., 2583 West Chester Pike, Broomall, Pa. 19008 (215 ELgin 6-6771)

TIME CODE GENERATORS TIME CODE READERS TIME CODE GENERATOR/READERS TIME DISPLAY UNITS



CHRONO-LOG CORPORATION

2583 WEST CHESTER PIKE, BROOMALL, PA. 19008

215 - ELGIN 6-6771

In accordance with your inquiry, we are pleased to enclose our Bulletin on the Model 20,000 Chrono-log Time Code Generators. These economically priced units are available to generate any of the major time code formats, as well as providing parallel logic level outputs, pulse rate outputs and a variety of optional outputs.

A typical Model 20,000 Time Code Generator for IRIG-B or NASA-36 bit codes (without day of the year) is priced at \$2,460. Other units are available for all major time codes at similar economical prices. Shipment can be made about 60 days after receipt of the order.

The Chrono-log Time Code Generators feature a unique BCD front panel display of all time, counting and logic registers. The operation of the Generator can be observed and checked out from the front panel on a step-by-step basis.

Chrono-log Corporation has been manufacturing digital timing equipment for eight years. Among the users of the Chrono-log solid-state Time Code Generators and Readers are the following:

NASA, Greenbelt, Maryland
NASA, Ames, California
University of California, Brain Research Institute
McGill University, Toronto, Canada
Holloman Air Force Base, New Mexico
Hughes Aircraft, California

Chrono-log Corporation offers a complete line of Time Code Readers, Time Code Generators and Time Code Display Units, as well as a combined Time Code Generator/Reader. Should you wish further information on these devices or the Chrono-log Digital Clocks, please do not hesitate to contact us. You will find that the Chrono-log Time Code equipment provides flexibility and reliability at lowest cost.

We appreciate your interest in our products and look forward to working with you on your time code requirements.

Very truly yours,

Arthur Freilich

AF/ab